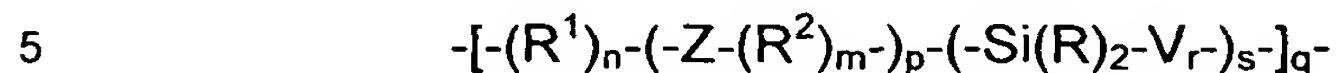


WHAT IS CLAIMED IS:

1. A medical device comprising a polymer comprising a group of the formula:



wherein:

$n = 0$  or  $1$ ;

$m = 0$  or  $1$ ;

10  $p = 1-100,000$ ;

$r = 0-100,000$ ;

$s = 1-100,000$ ;

$q = 1-100,000$ ;

15  $R^1$  and  $R^2$  are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

20  $Z$  is  $-C(R^3)_2-$  wherein each  $R^3$  is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two  $R^3$  groups within  $-C(R^3)_2-$  can be optionally joined to form a ring;

each  $R$  is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms; and

25  $V$  is  $-O-Si(R)_2-$  or  $R^1$ .

2. The medical device of claim 1 wherein  $p = 1-5000$ .

3. The medical device of claim 2 wherein  $p = 2-12$ .

30

4. The medical device of claim 1 wherein  $R^1$  and  $R^2$  are each independently a straight chain alkylene group, an arylene group, or combinations thereof.

5. The medical device of claim 4 wherein R<sup>1</sup> and R<sup>2</sup> are each independently a straight chain alkylene group.
6. The medical device of claim 1 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing up to 100 carbon atoms.
7. The medical device of claim 6 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing up to 20 carbon atoms.
8. The medical device of claim 7 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing 2 to 20 carbon atoms.
9. The medical device of claim 1 wherein each R<sup>3</sup> is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.
10. The medical device of claim 9 wherein each R<sup>3</sup> is independently a straight chain alkyl group, optionally including heteroatoms.
11. The medical device of claim 10 wherein each R<sup>3</sup> is independently a straight chain alkyl group containing 1 to 20 carbon atoms.
12. The medical device of claim 1 wherein the polymer further comprises a urethane group, a urea group, or combinations thereof.
13. The medical device of claim 12 wherein the polymer comprises a segmented polyurethane.
14. The medical device of claim 1 wherein the polymer is a biomaterial.
15. The medical device of claim 14 wherein the polymer is substantially free of ether, ester, and carbonate linkages.

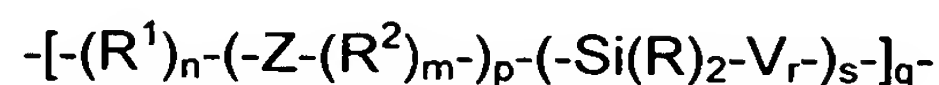
16. The medical device of claim 1 wherein the polymer is linear, branched, or crosslinked.
17. A medical device comprising a polymer prepared from a  
 5 compound of the formula:  

$$Y-[-(R^1)_n-(-Z-(R^2)_m)_p-(-Si(R)_2-V_r)_s]_q-R^5-Y$$
  
 wherein:  
 each Y is independently OH or NR<sup>4</sup>H;  
 n = 0 or 1;  
 10 m = 0 or 1;  
 p = 1-100,000;  
 r = 0-100,000;  
 s = 1-100,000;  
 q = 1-100,000;  
 15 R<sup>1</sup>, R<sup>2</sup>, and R<sup>5</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;  
 Z is -C(R<sup>3</sup>)<sub>2</sub>- wherein each R<sup>3</sup> is independently a saturated or unsaturated aliphatic group, an aromatic group, or  
 20 combinations thereof, optionally including heteroatoms, wherein the two R<sup>3</sup> groups within -C(R<sup>3</sup>)<sub>2</sub>- can be optionally joined to form a ring;  
 each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof,  
 25 optionally including heteroatoms;  
 each R<sup>4</sup> is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and  
 V is -O-Si(R)<sub>2</sub>- or R<sup>1</sup>.
- 30 18. The medical device of claim 17 wherein p = 1-100.
19. The medical device of claim 18 wherein p = 2-12.

20. The medical device of claim 17 wherein the number average molecular weight of the compound of the formula  $Y-[-(R^1)_n-(-Z-(R^2)_m)_p-(-Si(R)_2-V_r)_s]_q-R^5-Y$  is no greater than about 100,000 grams/mole.
- 5 21. The medical device of claim 20 wherein the number average molecular weight of the compound of the formula  $Y-[-(R^1)_n-(-Z-(R^2)_m)_p-(-Si(R)_2-V_r)_s]_q-R^5-Y$  is about 1000 grams/mole to about 1500 grams/mole.
- 10 22. The medical device of claim 17 wherein  $R^1$  and  $R^2$  are each independently a straight chain alkylene group, an arylene group, or combinations thereof.
23. The medical device of claim 22 wherein  $R^1$  and  $R^2$  are each  
15 independently a straight chain alkylene group.
24. The medical device of claim 17 wherein  $R^1$  and  $R^2$  are each independently groups containing up to 100 carbon atoms.
- 20 25. The medical device of claim 24 wherein  $R^1$  and  $R^2$  are each independently groups containing up to 20 carbon atoms.
26. The medical device of claim 25 wherein  $R^1$  and  $R^2$  are each  
25 independently groups containing 2 to 20 carbon atoms.
27. The medical device of claim 17 wherein each  $R^2$  includes at least two carbon atoms.
28. The medical device of claim 17 wherein each  $R^3$  is independently  
30 a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.

29. The medical device of claim 28 wherein each  $R^3$  is independently a straight chain alkyl group, optionally including heteroatoms.
30. The medical device of claim 29 wherein each  $R^3$  is independently  
5 a straight chain alkyl group containing 1 to 20 carbon atoms.
31. The medical device of claim 17 wherein the polymer further comprises a urethane group, a urea group, or combinations thereof.
- 10 32. The medical device of claim 31 wherein the polymer comprises a segmented polyurethane.
33. The medical device of claim 17 wherein the polymer is a biomaterial.
- 15 34. The medical device of claim 33 wherein the polymer is substantially free of ether, ester, and carbonate linkages.
35. The medical device of claim 17 wherein each Y is OH.
- 20 36. The medical device of claim 17 wherein each  $R^4$  is independently H or a straight chain alkyl group.
37. The medical device of claim 36 wherein each  $R^4$  is independently  
25 a straight chain alkyl group containing 1 to 20 carbon atoms.
38. The medical device of claim 36 wherein each  $R^4$  is H.
39. The medical device of claim 17 wherein the polymer is linear,  
30 branched, or crosslinked.

40. A polymer comprising a group of the formula:



5 wherein:

n = 0 or 1;

m = 0 or 1;

p = 1-100,000;

r = 0-100,000;

10 s = 1-100,000;

q = 1-100,000;

R<sup>1</sup> and R<sup>2</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

15 Z is -C(R<sup>3</sup>)<sub>2</sub>- wherein each R<sup>3</sup> is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R<sup>3</sup> groups within -C(R<sup>3</sup>)<sub>2</sub>- can be optionally joined to form a ring;

20 each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms; and

V is -O-Si(R)<sub>2</sub>- or R<sup>1</sup>.

25 41. The polymer of claim 40 wherein p = 1-5000.

42. The polymer of claim 40 wherein p = 2-12.

30 43. The polymer of claim 40 wherein R<sup>1</sup> and R<sup>2</sup> are each independently a straight chain alkylene group, an arylene group, or combinations thereof.

44. The polymer of claim 43 wherein R<sup>1</sup> and R<sup>2</sup> are each independently a straight chain alkylene group.

45. The polymer of claim 40 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing 2 to 20 carbon atoms.

46. The polymer of claim 40 wherein each R<sup>3</sup> is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.

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47. The polymer of claim 46 wherein each R<sup>3</sup> is independently a straight chain alkyl group, optionally including heteroatoms.

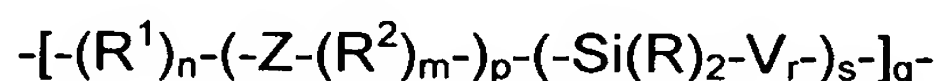
48. The polymer of claim 47 wherein each R<sup>3</sup> is independently a straight chain alkyl group containing 1 to 20 carbon atoms.

15

49. The polymer of claim 40 which is linear, branched, or crosslinked.

50. A polymer comprising a urethane group, a urea group, or combinations thereof, and a group of the formula:

20



wherein:

25

n = 0 or 1;

m = 0 or 1;

p = 1-100,000;

r = 0-100,000;

s = 1-100,000;

30

q = 1-100,000;

R<sup>1</sup> and R<sup>2</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is  $-C(R^3)_2-$  wherein each  $R^3$  is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two  $R^3$  groups within  $-C(R^3)_2-$  can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms; and

V is  $-O-Si(R)_2-$  or  $R^1$ .

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51. The polymer of claim 50 wherein  $p = 1-100$ .

52. The polymer of claim 51 wherein  $p = 2-12$ .

15 53. The polymer of claim 50 which is a segmented polyurethane.

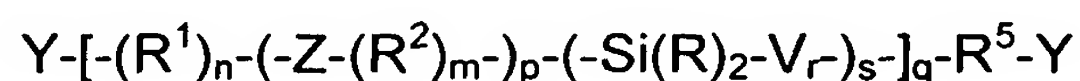
54. The polymer of claim 50 which is a biomaterial.

20 55. The polymer of claim 54 which is substantially free of ether, ester, and carbonate linkages.

56. The polymer of claim 50 which is linear, branched, or crosslinked.

57. A polymer prepared from a compound of the formula:

25



wherein:

each Y is independently OH or  $NR^4H$ ;

30

$n = 0$  or  $1$ ;

$m = 0$  or  $1$ ;

$p = 1-100,000$ ;

$r = 0-100,000$ ;



s = 1-100,000;

q = 1-100,000;

R<sup>1</sup>, R<sup>2</sup>, and R<sup>5</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

Z is -C(R<sup>3</sup>)<sub>2</sub>- wherein each R<sup>3</sup> is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R<sup>3</sup> groups within -C(R<sup>3</sup>)<sub>2</sub>- can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

each R<sup>4</sup> is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and

V is -O-Si(R)<sub>2</sub>- or R<sup>1</sup>.

58. The polymer of claim 57 wherein p = 1-100.

59. The polymer of claim 58 wherein p = 2-12.

60. The polymer of claim 57 wherein the number average molecular weight of the compound of the formula

Y-[-(R<sup>1</sup>)<sub>n</sub>-(-Z-(R<sup>2</sup>)<sub>m</sub>-)<sub>p</sub>-(-Si(R)<sub>2</sub>-V<sub>r</sub>-)<sub>s</sub>]<sub>q</sub>-R<sup>5</sup>-Y is no greater than about

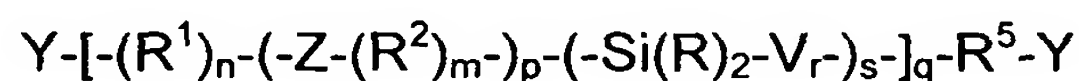
100,000 grams/mole.

61. The polymer of claim 57 wherein R<sup>1</sup> and R<sup>2</sup> are each independently a straight chain alkylene group, an arylene group, or combinations thereof.

62. The polymer of claim 61 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing up to 100 carbon atoms.

63. The polymer of claim 62 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing up to 20 carbon atoms.
64. The polymer of claim 63 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing 2 to 20 carbon atoms.
65. The polymer of claim 57 wherein each R<sup>2</sup> includes at least two carbon atoms.
66. The polymer of claim 57 wherein each R<sup>3</sup> is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.
67. The polymer of claim 66 wherein each R<sup>3</sup> is independently a straight chain alkyl group containing 1 to 20 carbon atoms.
68. The polymer of claim 57 wherein each Y is OH.
69. The polymer of claim 57 wherein each R<sup>4</sup> is independently H or a straight chain alkyl group.
70. The polymer of claim 57 which is linear, branched, or crosslinked.
71. A compound of the formula:

25



wherein:

- each Y is independently OH or NR<sup>4</sup>H;
- n = 0 or 1;
- m = 0 or 1;
- p = 1-100,000;
- r = 0-100,000;

30

s = 1-100,000;

q = 1-100,000;

5 R<sup>1</sup>, R<sup>2</sup>, and R<sup>5</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

10 Z is -C(R<sup>3</sup>)<sub>2</sub>- wherein each R<sup>3</sup> is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R<sup>3</sup> groups within -C(R<sup>3</sup>)<sub>2</sub>- can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

15 each R<sup>4</sup> is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and V is -O-Si(R)<sub>2</sub>- or R<sup>1</sup>.

72. The compound of claim 71 wherein R<sup>1</sup> and R<sup>2</sup> are each independently a straight chain alkylene group, an arylene group, or  
20 combinations thereof.

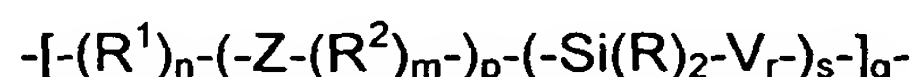
73. The compound of claim 72 wherein R<sup>1</sup> and R<sup>2</sup> are each independently groups containing up to 100 carbon atoms.

25 74. The compound of claim 72 wherein each R<sup>3</sup> is independently a straight chain alkyl group, an aryl group, or combinations thereof, optionally including heteroatoms.

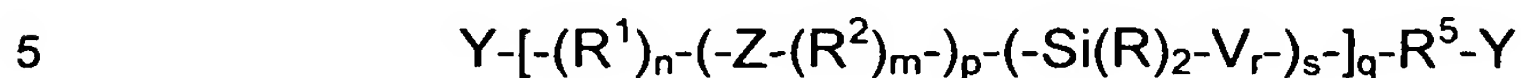
75. The compound of claim 72 wherein each Y is OH.

30

76. A method of making a polymer comprising a group of the formula



the method comprising combining an organic compound containing two or more groups capable of reacting with hydroxyl or amine groups with a polymeric starting compound of the formula:



wherein:

each Y is independently OH or NR<sup>4</sup>H;

n = 0 or 1;

10 m = 0 or 1;

p = 1-100,000;

r = 0-100,000;

s = 1-100,000;

q = 1-100,000;

15 R<sup>1</sup>, R<sup>2</sup>, and R<sup>5</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

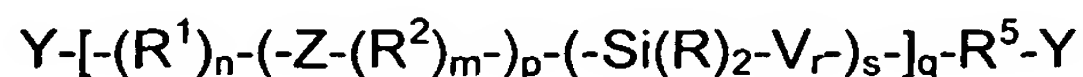
Z is -C(R<sup>3</sup>)<sub>2</sub>- wherein each R<sup>3</sup> is independently a saturated or unsaturated aliphatic group, an aromatic group, or  
20 combinations thereof, optionally including heteroatoms, wherein the two R<sup>3</sup> groups within -C(R<sup>3</sup>)<sub>2</sub>- can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof,  
25 optionally including heteroatoms;

each R<sup>4</sup> is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and

V is -O-Si(R)<sub>2</sub>- or R<sup>1</sup>.

30 77. A method of making a compound of the formula:



wherein:

each Y is independently OH or NR<sup>4</sup>H;

n = 0 or 1;

m = 0 or 1;

5 p = 1-100,000;

r = 0-100,000;

s = 1-100,000;

q = 1-100,000;

10 R<sup>1</sup>, R<sup>2</sup>, and R<sup>5</sup> are each independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

15 Z is -C(R<sup>3</sup>)<sub>2</sub>- wherein each R<sup>3</sup> is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms, wherein the two R<sup>3</sup> groups within -C(R<sup>3</sup>)<sub>2</sub>- can be optionally joined to form a ring;

each R is independently a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof, optionally including heteroatoms;

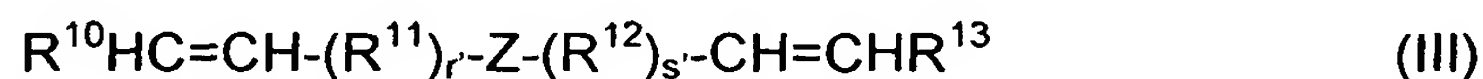
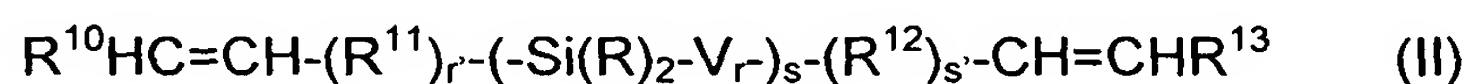
20 each R<sup>4</sup> is independently H or a saturated or unsaturated aliphatic group, an aromatic group, or combinations thereof; and

V is -O-Si(R)<sub>2</sub>- or R<sup>1</sup>;

the method comprising combining monomers of Formula II or

Formula III

25



30

wherein:

r, s, V, Z, and R are as defined above;

r' = 0 or 1;

s' = 0 or 1;

$R^{10}$  and  $R^{13}$  are each independently hydrogen or straight chain, branched, or cyclic alkyl groups containing up to 6 carbon atoms; and

5  $R^{11}$  and  $R^{12}$  are each independently a saturated aliphatic group, an aromatic group, or combinations thereof;

with an alkene metathesis catalyst and optionally applying a vacuum.

10